EARLY LEVEL 1B VALIDATION READINESS

PRESENTATION TO AIRS SCIENCE TEAM

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J. SUSSKIND, C. BARNET, J. BLAISDELL, L. IREDELL,
L. KOUVARIS, F. KEITA

Early Level 1B Validation Readiness

Things We Proposed To Do

- Examine earliest AIRS spectra for reasonableness
- Compute AIRS radiance biases and standard deviations for clear cases
- Generate channel noise covariance matrix (with and without tuning)
- Produce HIRS3 like radiances from AIRS and generate TOVS Pathfinder like retrievals

Are We Ready?

- All areas need work
- New computing hardware needed
    - Readiness contingent on timely delivery

Examine Earliest AIRS Spectra For Reasonableness
Compute AIRS Biases And Standard Deviations For Clear Cases

Method
- Compute spectral differences between observed radiances and computed radiances for clear cases
- Use NCEP forecast to compute radiances for 1 whole day of observations

Need to Install and Integrate
- Larry's angle correction
- Mitch's clear test
- Ability to read and colocate NCEP forecast (from Mitch)
- Code to fill in everything needed to compute radiances (from Mitch)

Need to Develop
- Code to compute statistics of radiance differences as a function of zenith angle
  - Mean and standard deviations
- Code to display zenith angle dependence of residuals for select channels

None of these are very difficult and we should be ready

There are 324000 retrievals per day
- If 3% called "clear" get 9720 clear cases per day
- Roughly 300 cases per zenith angle for 1 day

Should be ready by launch + 3 months

Generate Channel Noise Covariance Matrix

$\Delta_{NCHAN,NCASE} = R_{OBS} - R_{COMP}$ = Matrix of residuals

$\frac{1}{NCHAN}(\Delta - \bar{\Delta})(\Delta - \bar{\Delta})^{T}_{NCHAN,NCHAN}$ = Noise covariance matrix

If we remove bias only, channel noise covariance remains unchanged

"Tuning" may remove bias and lower noise covariance

$$R_{COMP} = R_{COMP} + \Delta R_{COMP}$$

We will investigate simple forms of ΔR_{COMP}

$$\Delta R_{COMP} = A + B(M_{OBS} - \bar{M}_{OBS}) + C(1 - \cos\theta) + D\sin(\theta)$$

M_{OBS} is matrix of AMSU and HSB channel observations

See if covariance of $(\Delta - \bar{\Delta})$ is lower

See which channel errors are correlated

None of the above is in place

Should be ready by launch + 3 months

Produce HIRS3 Like Radiances From AIRS And Generate TOVS Pathfinder-Like Retrievals

Method

Simulate HIRS3 radiances from AIRS simulated radiances

$$R_{I,HIRS} = \sum A_{IJ} R_{J,AIRS}$$

Use granule 401 simulation to generate coefficients

Simulate HIRS3 data from AIRS observed data

Modify Pathfinder program to incorporate simulated HIRS and AMSU data

Run TOVS Pathfinder program for 1 month with data simulated from AIRS observations

Compare results with NOAA 16 retrievals

Should be similar if AIRS is performing well

Needs a lot of preparation

May be ready by launch + 3 months